

# **SOUTH DAKOTA STATEWIDE FISHERIES SURVEY**

**2102-F21-R-46**

**Survey Location:** French Creek

**County:** Custer

**Dates of Present Survey:** June 18 - July 10, 2013

## **INTRODUCTION**

Fish populations in the French Creek Watershed within the Black Hills Trout Management Area (BHTMA) (**Error! Reference source not found.**) were surveyed intensively during 2012. This is the first time that a survey of this magnitude was done in French Creek. The French Creek Watershed lies south of the Battle Creek Watershed and includes part of Custer State Park (CSP). The headwaters of French Creek lie about seven miles west of the city of Custer and the creek flows southeast through Custer State Park. It crosses Hwy 79 near Fairburn and drains into the Cheyenne River about 14 miles east near Red Shirt. A portion of the creek experiences a loss zone in most years from east of the East Primitive Campground in CSP to almost Fairburn. The French Creek Watershed within the BHTMA is in a pine/spruce forest managed by the United States Forest Service (USFS) and the State of South Dakota. As with the rest of the Black Hills, many USFS roads cut through the watershed with a few houses and ranches present. French Creek is stocked with catchable (11 in) Rainbow Trout from just downstream of Stockade Lake to Horse Camp in CSP. French Creek and its tributaries are managed under standard BHTMA regulations with a daily limit of five trout (in any combination) with one allowed 14 inches or longer.

## **SURVEY METHODS**

### *French Creek Survey Site Selection*

The main stem of French Creek was divided into four segments (Figure 1) based on morphologic, hydrologic, or geographic characteristics. Each segment was assigned a specific number of 100 m reaches to be sampled based on length of the segment and importance as a fishery. Sample reaches were numbered based on their distance, in 100 meters, above the confluence with the Cheyenne River. Segment 1 began at the east end of the loss zone near a low-head dam and went upstream through the French Creek Natural Area to Bluebell Campground. This area is accessible by foot or horseback only. Six reaches were sampled in this segment by backpack electrofishing (Figure 2). Additionally, the area called "the narrows" was sampled by angling because pools are too deep to sample with electrofishing. Segment 2 was from Bluebell Campground upstream to Stockade Lake. This segment runs through CSP and exits CSP for a bit along Lower French Creek Road where the adjacent land is mostly private. It enters CSP again near Stockade Lake. Six reaches were sampled in Segment 2 (Figure 3). Segment 3 was from the inlet to Stockade Lake and went upstream through the city of Custer to Custer Municipal Dam. During 2013 the stream above Custer High School was only inches deep and stagnant; therefore only two reaches were sampled in this segment. Segment 4 would have been from Custer Municipal Dam up to French Creek's forks; however, this segment was very shallow and mostly stagnant, so it was not sampled.

## Sample Methods

Efforts were made to satisfy the assumptions 1) the population is static, 2) capture probability remains constant across sampling periods, and 3) all fish in the population are equally vulnerable to capture (Van Den Avyle and Hayward 1999; Hayes et al. 2007). Block nets at the upstream and downstream boundaries were used to prevent fish from emigrating or immigrating within the sample reach. Three passes were generally made with one, two, or three backpack electrofishing units (depending on stream width), and captured fish were removed and held in holding cages between passes until processing. For all reaches, captured fish were anesthetized with carbon dioxide (made by mixing glacial acetic acid and baking soda in water), measured to the nearest millimeter (mm) total length, weighed to the nearest gram (g). Fish were then held in recovery cages and returned to the stream after recovery. When 50 individual lengths and weights were collected from small fish (<100 mm) of a specific species, bulk counts were collected to expedite data collection. Data was entered into Coldstream database. The Coldstream database was used to calculate parameters such as population estimates of fish per 100 meters and estimated numbers of fish per acre. Calculations are based on depletion of fish numbers in each pass, and the catchability of fish within each reach.

In addition to fish data, pH, temperature, and specific conductance were measured and recorded. Stream widths were measured every ten meters and averaged to obtain an estimate of total area sampled.

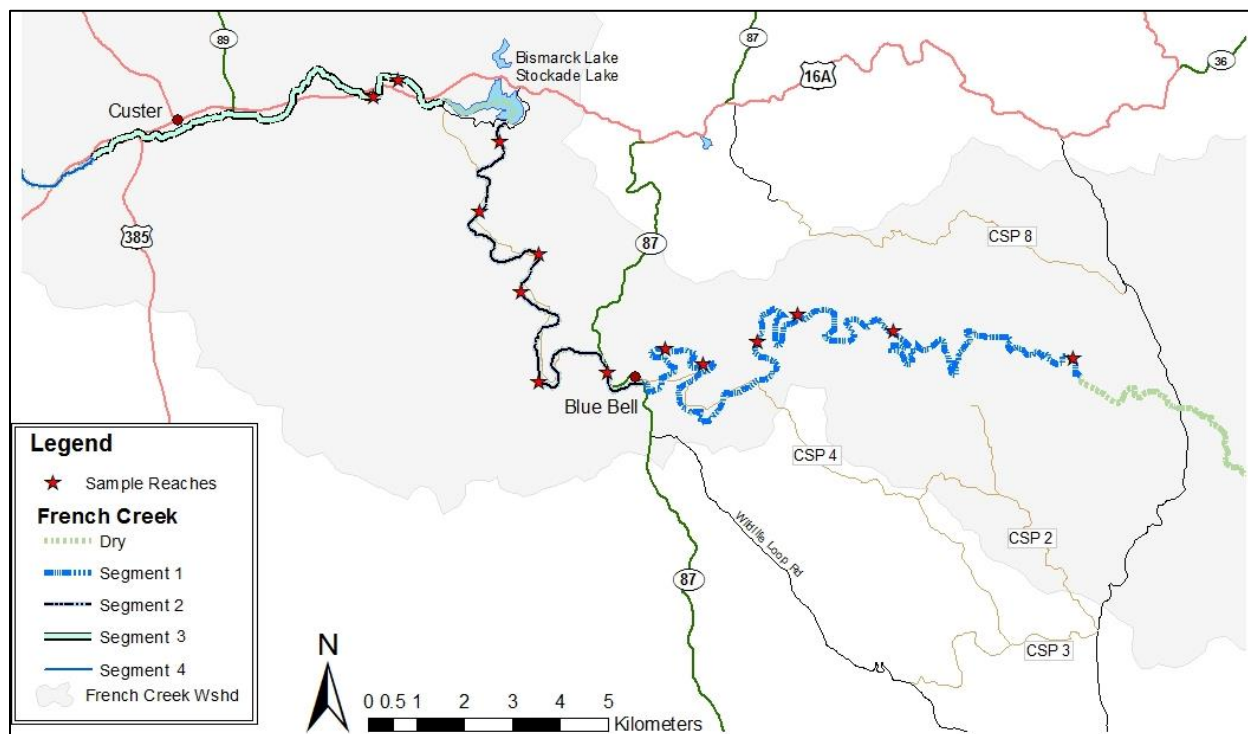


Figure 1. Map of French Creek Watershed with 2013 sample segments and sample reaches delineated.

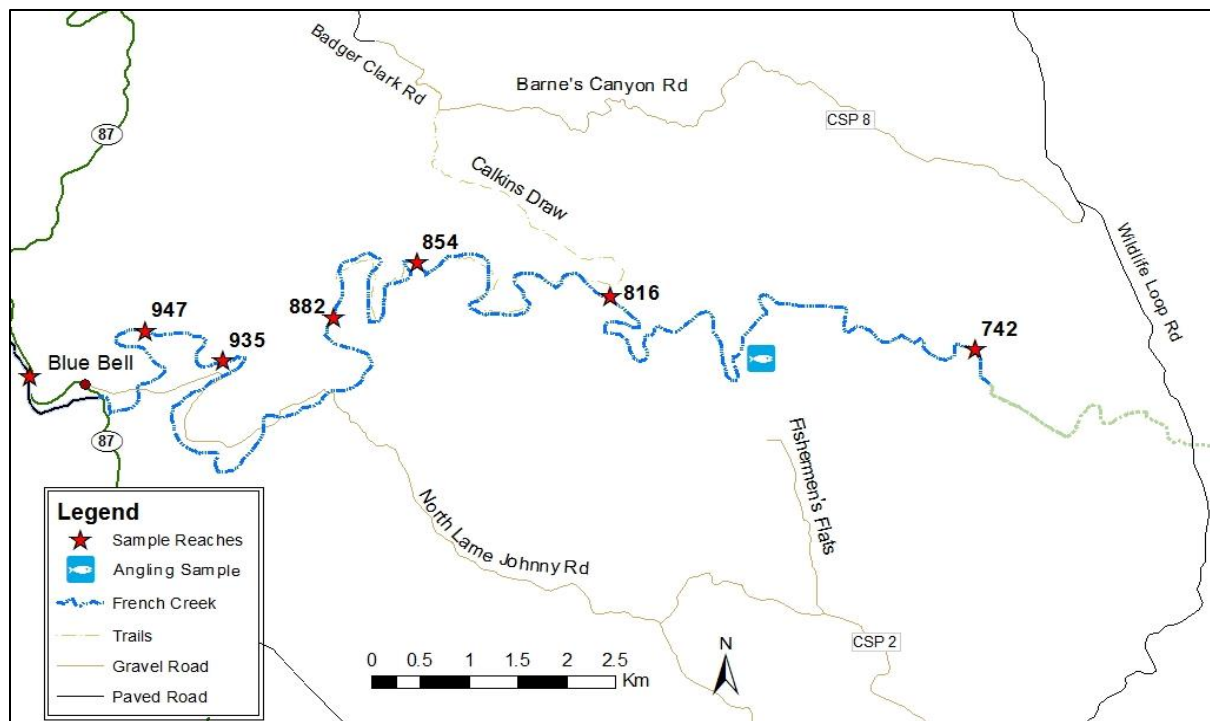


Figure 2. Map of sample reaches in Segment 1 of French Creek in Custer State Park, SD.

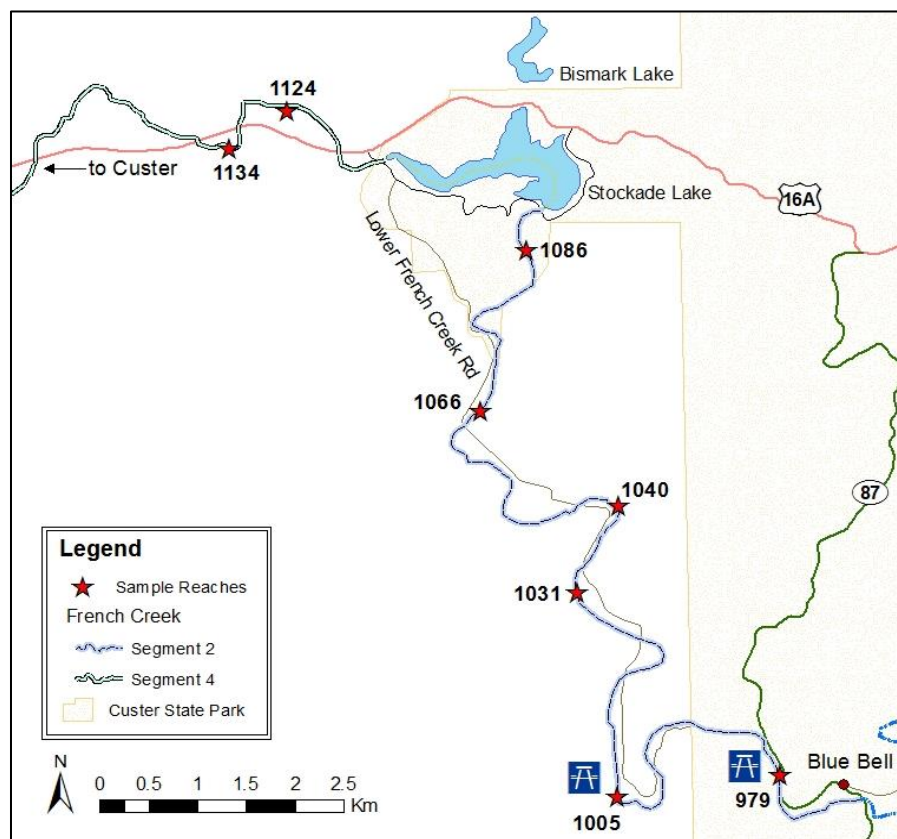


Figure 3. Map of sample reaches in Segments 2 and 3 of French Creek, South Dakota.

## RESULTS AND DISSCUSSION

### Overview

Sixteen species of fish were sample in French Creek in 2013. Longnose Dace *Rhinichthys cataractae* was the most abundant species in Segments 1 and 2. Creek Chub *Semotilus atromaculatus* was the most abundant species in Segment 3 and numerous in Segments 1 and 2. White Sucker *Catostomus commersonii* and Fathead Minnow *Pimephales promelas*, were sampled at almost every reach. Brown Trout *Salmo trutta* were sampled in most reaches in Segments 1 and 2. Brook Trout *Salvelinus fontinalis* were sampled in two reaches in Segment 2. Rainbow Trout *Oncorhynchus mykiss* were sampled in those same two reaches as well as one reach in Segment 1. No trout were sampled in Segment 3. As far as other game fish species, a few each of Smallmouth Bass *Micropterus dolomieu*, Largemouth Bass *Micropterus salmoides*, Black Crappie *Pomoxis nigromaculatus*, Bluegill *Lepomis macrochirus*, Northern Pike *Esox lucius*, and Yellow Perch *Perca flavescens* were sampled. Due to low abundance, these species will not be discussed further. Mountain Sucker *Catostomus platyrhynchus*, (a native species of greatest conservation need in South Dakota) was sampled at two reaches in Segment 2. They were not sampled in the French Creek watershed during the Mountain Sucker study in 2009-2010, but were present during surveys in the 1990s. Additionally, an interesting surprise was sampling a few of Iowa Darters *Etheostoma exile* in Segments 2 and 3, which have not previously been sampled in the Black Hills. They are native to the Missouri River Basin and have been found in prairie streams of South Dakota and surrounding states (Hayer et. al 2006).

### Summary by species

#### Brown Trout

During the 2013 survey of French Creek, Segment 1 (French Creek natural area to Bluebell Campground) was characterized by long shallow runs (<0.3m) leading into deep pools that were often too deep to sample. There is very little intermediate habitat. This affected catch during the survey and the results likely underestimate actual trout densities within these deeper pools. Also, water temperatures were high, ranging from 21 °C to 25°C at the surface. That being said, Segment 1 meets the classification of a Class 2 Brown Trout fishery (25-150 fish  $\geq 200$  mm per acre) with an average estimate of 52.8 fish/acre (Table 1). The two upper reaches (935 and 947) observed separately had lower densities and were within a Class 3 Brown Trout fishery (<25 fish  $\geq 200$  mm per acre). The highest abundance and density of Brown Trout  $\geq 200$ mm in Segment 1 was sampled at reach 816 near Calkins Draw with an estimated population size of 20 fish per 100 m and 128 per acre.

In addition to the backpack electrofishing survey, the area known as “the narrows” was accessed through Fishermen’s Flats and fished with fly rods by five anglers and a spinning rod by one angler. Brown Trout and Largemouth Bass were observed in deep pools and two Brown Trout were caught. Additionally, 64 Creek Chub were caught. This area was stocked by horseback with 1,000 fingerling Brown Trout in 2008. Anglers have reported catching some Brown Trout, Largemouth Bass, Smallmouth Bass, and Northern Pike in this area.

Segment 2 (Bluebell Campground to Stockade Lake) can be characterized similarly to Segment 1 with long shallow runs leading to deep pools. Surface water temperatures were also high ranging from 18 to 25°C at the surface. Segment 2 had fewer Brown Trout sampled than Segment 1. The average estimated density for this segment was 20.5 fish  $\geq 200$  mm per acre making it a Class 3 fishery. However, the three lower sample reaches had densities of 32-44 fish per acre qualifying them as a Class 2 Brown Trout fishery. These three reaches were characterized by long deep pools.

Table 1. Average population (number/100 m) and density (number/acre) estimates of Brown Trout by length group (mm) in French Creek during the 2013 survey. Segments number in upstream progression from the east side of Custer State Park (1) to the city of Custer (3). The range of fish numbers sampled in all reaches per segment is in parenthesis.

Segment	<200 mm/100 m	$\geq 200$ mm/100 m	$\geq 200$ mm/acre	$\geq 300$ mm/100 m
1	14.0 (0-49)	7.8 (1-20)	52.8 (9-128)	1 (0-3)
2	1 (0-2)	2.8 (0-6)	20.5 (0-44)	2 (0-5)
3	no trout sampled			

Caution must be taken when interpreting age data from the length-frequency distribution since hard structures (i.e. scales, otoliths, etc.) of fish were not collected to verify the age of the length classes. However, since this method typically works well for early age classes (Isely and Grabowski 2007), it will be assumed that length-frequency distributions in this report accurately portray size of fish at ages 0, 1, and 2+ years when separate modes are distinguishable.

Length-frequency distributions of Brown Trout in Segment 1 do clearly show the age-0 and age-1 modes (Figure 4). The age-0 mode is near 60 mm, the age-1 mode is around 140 mm and the age-2+ mode appears to become prevalent near 200 mm. The PSD for Brown Trout in Segment 1 was 40.3 with 27 fish over quality length (230mm). In Segment 2, no Brown Trout were caught between 135 and 230 mm, but Segment 2 did have a greater number of fish  $\geq 300$  mm than were found in Segment 1.

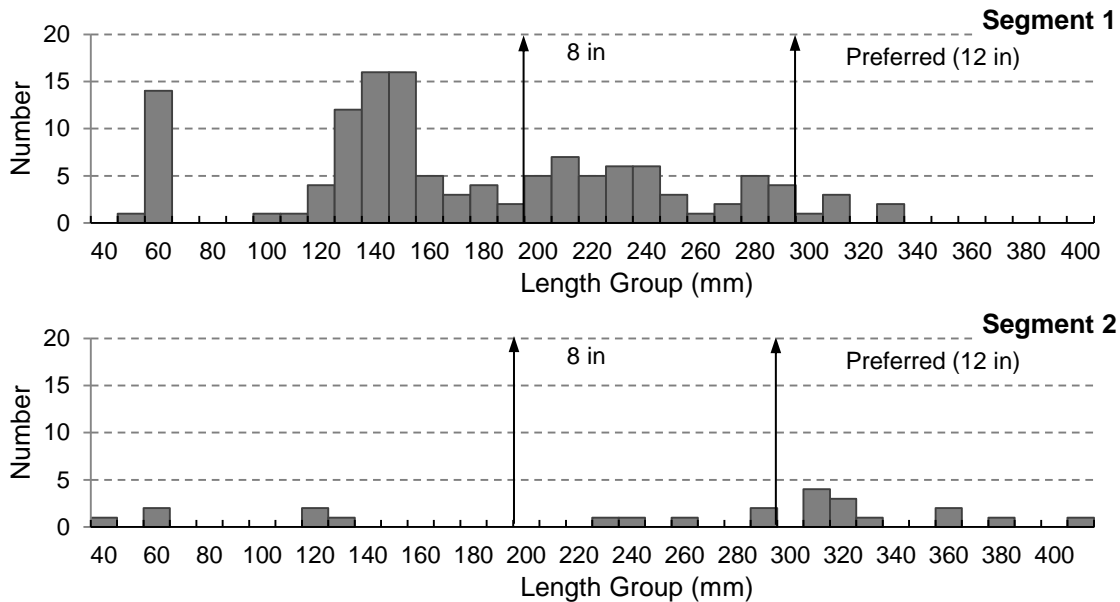


Figure 4. Length frequency histogram for Brown Trout surveyed in Segments 1 and 2 of French Creek, SD during the 2013 survey.

#### Rainbow Trout

Catchable Rainbow Trout were stocked in 2013 into locations near Bluebell Campground and along the road to Horse Camp in May with 800 fish and June with 400 fish. No Rainbow Trout were caught during the survey in this area; however, they were stocked into the deepest pools where sampling could not be conducted. One individual <200 mm was sampled at reach 742, near the East Primitive Campground in the French Creek Natural Area. Reaches 1005 and 1031 in segment 2 contained a few Rainbow Trout  $\geq 200$  mm with 7 and 13 per acre respectively. The area does get stocked with some Rainbow Trout at stream crossings and deeper pools throughout the spring and summer.

#### Brook Trout

Reaches 1005 and 1031 also had Brook Trout with 32 and 73 fish  $\geq 200$  mm per acre, respectively, meeting the requirements of a Class 2 Brook Trout Fishery (25-150 fish  $\geq 200$  mm per acre).

#### Longnose Dace

Longnose Dace were the most abundant species in Segments 1 and 2 with 38 to 562 fish sampled per 100 m reach (Table 2). They are a native species found commonly throughout the Black Hills. None were captured in Segment 3. Typically, they were found in the long shallow runs of the sample reach.

#### Creek Chub

Creek Chub was the most abundant species in Segment 3 with 682 and 462 individuals sampled in reaches 1124 and 1134, respectively. Segment 1 had an average reach abundance

of 73.5 and Segment 2 average abundance was 224.3 (Table 2). Their length range was 21-251 mm. Creek Chub is also a native species found commonly throughout the Black Hills.

### White Sucker

White Sucker was sampled in every reach during the French Creek survey in 2013 with the highest average sample size occurring in Segment 2 (Table 2). Number of fish per reach ranged from 11 to 181 in Segment 1. Numbers ranged from 43 to 196 fish in Segment 2 and from 68 to 98 fish per reach in Segment 3.

Table 2. Average sample size (number/100 m) of native fish French Creek during the 2013 survey. Segments number in upstream progression from the east side of Custer State Park (1) to the city of Custer (3). Species include Longnose Dace (LND), Creek Chub (CRC), White Sucker (WHS), Fathead Minnow (FHM), Brook Stickleback (BSB), Mountain Sucker (MTS), and Iowa Darter (IOD).

Segment	LND	CRC	WHS	FHM	BSB	MTS	IOD
1	222.3	75.3	81.3	13.7	0	0	0
2	230.7	224.3	107.0	3.3	2.6	1.0	0.8
3	0	572.0	83.0	8.5	19.5	0	0.5

### *Past Surveys*

Reaches in Segment 1 have not been sampled much in the past. In 2009 sample reaches 853 and 917 (near Horse Camp) were sampled with single pass electrofishing and had similar results to 2013. In 1993 those reaches were sampled with three pass surveys and yielded similar species with population estimates of Brown Trout  $\geq 200$  mm at 9 and 24 fish/100 m per reach, respectively. At that time, this area was stocked with 2,400-3,400 catchable Brown Trout annually. Additionally, Mountain Suckers were sampled in 1993 and 1994, but not in 2009. Reach 741 (near the French Creek natural area east primitive campground) was sampled with a single pass in 2009 and had similar results to reach 742 in 2013. Reach 741 was also sampled in 1993 with higher abundances of Brown Trout  $\geq 200$  mm (38 fish/100 m) and some Rainbow Trout  $< 200$  mm (17 fish/100 m).

A few reaches in Segment 2 were sampled in 1992. One of these, reach 979, had the same number of Brown Trout  $\geq 200$  mm as in 2013, at 5 fish/100 m. It also had similar numbers of native fish with less Creek Chub and more White Sucker sampled. Reach 1066 was sampled in 1992 and had a population estimate for Brown Trout  $\geq 200$  mm of 22 fish/100 m. Only native fish were collected in 2009 and 2013 at this reach.

Segments 3 and 4, which had no trout sampled in 2013, have been sampled in the past with trout present. Reach 1134 was surveyed in 1994 and had a Rainbow Trout population estimate of 22 fish  $\geq 200$  mm/100 m. Reach 1241 (above Custer Municipal Pond) was sampled in 1994 with 7 Rainbow Trout  $\geq 200$  mm/100 m.

## **RECOMMENDATIONS**

1. Continue to manage the majority of French Creek as a wild Brown Trout (natural yield) fishery with a daily limit of five trout (in any combination) and one allowed 14 in or longer.
2. Continue spring and summer stocking areas of French Creek from Stockade Lake to Bluebell Horse Camp in Custer State Park with either catchable Rainbow Trout or Brown Trout.
3. Evaluate angler use of the French Creek fishery.
4. Increase angler knowledge about the French Creek fishery.
5. Perform intensive population surveys in French Creek every seven to ten years.

## **REFERENCES**

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## APPENDIX

Appendix A. Stocking record for French Creek, South Dakota, 2004-2013. Catchables are around 11 inches.

Year	Species (Strain)	Size	Stockings	Number	Comments
2004	Rainbow Trout (Shasta)	Catchable	1	650	
	Rainbow Trout	Catchable	1	25	
2005	Rainbow Trout (Eagle Lake)	Catchable	1	300	
	Rainbow Trout (Shasta)	Catchable	2	600	
2006	Rainbow Trout (Shasta)	Catchable	2	600	
2008	Rainbow Trout (Shasta)	Catchable	1	90	
	Brown Trout	Fingerlings	1	1,000	At narrows
2009	Rainbow Trout (McConaughy)	Catchable	2	600	
	Rainbow Trout (Shasta)	Catchable	1	300	
	Brown Trout (Soda Lake)	Catchable	1	300	
	Brown Trout	Fingerling	1	2,500	
2010	Rainbow Trout (McConaughy)	Catchable	1	900	
	Brown Trout (Soda Lake)	Catchable	1	300	
	Brown Trout	Fingerling	1	2,500	
2011	Rainbow Trout (Shasta)	Catchable	1	1,200	
2012	Rainbow Trout (Shasta)	Catchable	3	1,200	
2013	Rainbow Trout (Shasta)	Catchable	2	1,200	